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AN ESTIMATE OF THE MIGRATORY TIMING AND ABUNDANCE OF
SOCKEYE SALMON INTO UPPER COOK INLET, ALASKA, IN 1996

By: Kenneth E. Tarbox

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ABSTRACT

During the 1996 Upper Cook Inlet, Alaska commercial salmon fishing season a test fishery was used to estimate the timing of the sockeye salmon *Oncorhynchus nerka* run as it passed a transect along the southern boundary of the management area. The test fishery operated from 1 July to 29 July and captured 2,481 sockeye salmon representing 1,723 CPUE points. Mean date of the run was 13 July, and the test fishery encompassed approximately 98.7% of the total run.

KEY WORDS: Salmon, *Oncorhynchus*, Upper Cook Inlet, Alaska, test fishery, migratory behavior

INTRODUCTION

In 1979 the Alaska Department of Fish and Game (ADF&G) began a test fishing project near the southern boundary of the Upper Cook Inlet (UCI) salmon management area (Figure 1). The objective of this project was to estimate the total run of sockeye salmon *Oncorhynchus nerka* to UCI before salmon reached commercial harvest areas. Such information has helped ADF&G management biologists set commercial fishing times and areas to harvest sockeye salmon surplus to spawning needs. Test fishing results have been reported annually since 1979 (Waltemyer 1983a, 1983b, 1986a, 1986b, Hilsinger and Waltemyer 1987, Hilsinger 1988, Tarbox and Waltemyer 1989, Tarbox 1990, 1992, 1994, 1995, 1996). This report presents the results of the 1996 test fishing project.

METHODS

Test Fishing

Sockeye salmon returning to Upper Cook Inlet were sampled by fishing geographically fixed stations between Anchor Point and Red River Delta (Figure 1). Stations were numbered consecutively from east to west. Station locations were determined from LORAN C coordinates. A chartered test fishing vessel sampled stations 4 - 8 daily. To increase sampling power an additional station (6.5) was sampled every other day.

Sampling started on 1 July and continued through 30 July. The chartered vessel, *F/V Corrina Kay*, fished 366 m (1,200 ft) of 2.1 cm (5 1/8 in) multifilament gill net during test fishing. Drift gill net web had a filament size number of 53/S6F, was 45 meshes deep, and was constructed of double knot Super Crystal shade number 1.

All salmon captured were identified to species. All sockeye salmon were measured for length (mid-eye to fork-of-tail in mm). The number of each species caught at each station was expressed as a catch per unit of effort (CPUE) statistic:

$$CPUE_s = \frac{100 \text{ fm} \times 60 \text{ min} \times \text{number of fish}}{\text{fm of gear} \times \text{MFT}}, \quad (1)$$

where: $CPUE_s$ = CPUE for station s, and
MFT = mean fishing time.

Mean fishing time was calculated as:

$$\text{MFT} = (C - B) + \frac{[B - A] + [D - C]}{2}, \quad (2)$$

where: A = time net deployment started,
 B = time net fully deployed,
 C = time net retrieval started, and
 D = time net fully retrieved.

Once deployed at a station, gill nets were fished 30 min before retrieval started.

Daily CPUE (CPUE_d) was calculated as:

$$\text{CPUE}_d = \sum_{s=1}^n \text{CPUE}_s \quad (3)$$

The following physical and chemical measurements were taken at the start of each set: air temperature, water temperature (at 1 m below the surface), wind velocity and direction, tide stage, water depth, and water clarity. Air and water temperatures were measured using a YSI salinity/temperature meter. Unfortunately, the salinity meter malfunctioned during the project. Wind speed was measured in knots and direction was recorded as 0 (no wind), 1 (north), 2 (northeast), 3 (east), 4 (southeast), 5 (south), 6 (southwest), 7 (west), or 8 (northwest). Tide stage was classed as flood, ebb or slack by observing the movement of the vessel while drifting with the gill net. Water depth was measured in fm using a Simrad echo sounder, and water clarity was measured in m using a 17.5 cm secchi disk.

Describing the Salmon Migration

Catchability, the fraction of the available population taken by a defined unit of fishing effort, was estimated as:

$$q_d = c_d / r_d, \quad (4)$$

where: q_d = estimated catchability on day d ,
 r_d = adjusted cumulative total return on day d , and
 c_d = cumulative CPUE on day d .

Passage rate, the expansion factor used to convert CPUE into estimated numbers of salmon passing the test fishing transect, was calculated as:

$$PR = 1/q_d = \text{passage rate} \quad (5)$$

Since the test fishery did not encompass the entire sockeye salmon run, the total CPUE for the test fishery was estimated after the season using the following relationship:

$$CPUE_t = CPUE_r \times \frac{H_t}{H_{(f+2)}}, \quad (6)$$

where: $CPUE_t$ = total estimated CPUE for the season,
 $CPUE_r$ = cumulative CPUE through final day, f , of test fishing,
 H_t = total commercial harvest for the season
 $H_{(f+2)}$ = total commercial catch through final day of test fishery ($f+2$), and
 2 = number of days it took salmon to travel from test fishery to commercial harvest areas.

Estimates of $CPUE_t$ and $CPUE_d$ values were used to estimate daily and cumulative proportions of $CPUE_t$, based on a non-linear model:

$$y_d = 1/(1 + e^{-(a+bd)}) \quad (7)$$

where: y_d = cumulative proportion of CPUE or return on day d ,
 a and b = coefficients of model,
 d = day of observation.

To calculate mean date of return, the following formula was used:

$$M = a/b \quad (8)$$

where: M = mean date of return.

RESULTS AND DISCUSSION

A total of 2,481 sockeye salmon, 119 pink salmon *O. gorbuscha*, 491 chum salmon *O. keta*, 758 coho salmon *O. kisutch*, and 3 chinook salmon *O. tshawytscha*, were captured during the 1996 test fishery (Table 1, Appendices A-D). Daily sockeye salmon catches ranged from 7 to 290 fish (Table 1).

Sockeye salmon daily CPUE values ranged from 5.6 on 21 July to 183 on 15 July. Cumulative total CPUE for the duration of the project was 1,723 (Table 1). Using post season commercial harvest figures, test fishing spanned approximately 98.7% of the total run. Therefore, total CPUE for the test fishery would have been 1,746 if test fishing had continued throughout the duration of the run.

Sockeye salmon catches along the transect were similar to the distribution of CPUE values (Tables 2 and 3).

Examination of daily and cumulative proportions (estimated post season) of the sockeye salmon run to UCI suggested that 5.6% of the run had passed the transect prior to the start of test fishing on 1 July and that the run was 97.1% completed at project termination (Appendix E; Figure 2). The mean date of the run was 13 July which was two days early relative to the historic average (Table 4).

The total sockeye salmon run to UCI in 1996 was estimated to be 5.6 million fish of which 3.89 million were harvested in the commercial fishery (Table 5). Estimated passage rate for the season was 3,207 sockeye salmon per CPUE index point.

Water temperatures measured along the transect were relatively warm (10-11° C) early in July, cooled to 8-9°C in mid July, and then warmed to a high of 12.0°C toward to the end of July (Appendix F). Air temperatures fluctuated between 10°C and 16°C during the project (Appendix F). Wind velocities were generally low to moderate. However, winds of 20 knots or greater were recorded on nine days (Appendix F). Wind direction was variable.

During the commercial salmon fishing season five estimates of the sockeye salmon total run were made (Appendix G). In all cases the estimates were higher than the actual return. The estimates ranged from 5.9 million sockeye salmon on 5 July to over 8 million sockeye salmon on 19 July. The number of fish entering the district dropped dramatically after mid-July (Figure 3). This resulted in the test fish model to over-estimate the run because projections were based on a strong and slightly late return. Fortunately, this did not result in the direct over-harvest of salmon stocks as managers were aware of this atypical entry pattern in Bristol Bay. Therefore, estimates of abundance used in the decision process assumed an on-time run of 6.0 million fish (Ruesch, Alaska Department of Fish and Game, personal communication). If the return had indeed been 8 million fish other indicators of run strength, such as the drift gill net harvest, would have indicated this level of return and managers would have responded accordingly.

The 1996 season again points out the inherent flaw in the offshore test fish project. The curve fitting procedure tends to favor late returns and therefore over-estimate the return early in the season. However, with experienced personnel, other indicators of run strength, and knowledge of this bias managers have adjusted by factoring this imprecision into their thinking. While not as precise as managers would like, the program does provide valuable data for decision making.

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Table 1. Summary of sockeye salmon fishing effort, daily and cumulative catch, and daily and cumulative CPUE, Upper Cook Inlet offshore test fish project, 1996.

Date	Number of Stations	Mean Fishing Time (min)	Catch		CPUE		Mean Length (mm)
			Daily	Cumul.	Daily	Cumul.	
01-Jul	6	209.5	32	32	28.0	28.0	552
02-Jul	5	181.0	13	45	10.6	38.6	534
03-Jul	6	222.5	44	89	34.0	72.6	564
04-Jul	5	196.5	146	235	103.9	176.5	552
05-Jul	6	244.5	176	411	125.5	302.0	536
06-Jul	5	191.0	66	477	51.6	353.6	529
07-Jul	6	212.5	29	506	23.3	376.9	543
08-Jul	5	184.0	16	522	12.9	389.7	527
09-Jul	6	243.5	190	712	126.7	516.4	553
10-Jul	5	186.0	15	727	12.4	528.9	532
11-Jul	6	245.0	137	864	93.6	622.5	566
12-Jul	5	204.5	90	954	59.9	682.4	575
13-Jul	4	162.0	161	1115	106.9	789.3	573
14-Jul	5	204.5	116	1231	76.5	865.8	576
15-Jul	6	262.0	290	1521	183.0	1048.7	567
16-Jul	5	177.5	90	1611	78.6	1127.3	571
17-Jul	6	263.5	263	1874	156.9	1284.2	599
18-Jul	5	193.5	52	1926	38.6	1322.8	547
19-Jul	6	241.0	110	2036	77.0	1399.8	582
20-Jul	5	187.5	55	2091	42.9	1442.7	583
21-Jul	6	216.5	7	2098	5.6	1448.4	587
22-Jul	5	192.5	71	2169	47.8	1496.2	580
23-Jul	6	225.0	45	2214	33.0	1529.2	539
24-Jul	4	158.0	58	2272	41.8	1571.0	546
25-Jul	6	227.0	26	2298	17.8	1588.8	577
26-Jul	5	169.0	56	2354	39.7	1628.5	567
27-Jul	6	236.0	75	2429	53.4	1681.9	567
28-Jul	5	164.5	8	2437	7.3	1689.3	545
29-Jul	6	224.0	44	2481	34.0	1723.2	580

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Table 2. Estimated sockeye salmon catch by date and station,
Upper Cook Inlet offshore test fish project, 1996.

Date	Station Number						Total
	4	5	6	6.5	7	8	
01-Jul	10	13	0	7	1	1	32
02-Jul	0	9	2		0	2	13
03-Jul	0	19	21	3	1	0	44
04-Jul	83	52	4		6	1	146
05-Jul	45	21	59	23	20	8	176
06-Jul	5	10	13		34	4	66
07-Jul	24	1	3	0	0	1	29
08-Jul	9	4	2		1	0	16
09-Jul	82	86	16	6	0	0	190
10-Jul	2	10	0		1	2	15
11-Jul	22	17	0	67	31	0	137
12-Jul	13	14	58		2	3	90
13-Jul	5	44	32	80			161
14-Jul	1	79	28		3	5	116
15-Jul	2	48	56	99	79	6	290
16-Jul	0	7	3		80	0	90
17-Jul	0	49	90	107	17	0	263
18-Jul	0	7	7		37	1	52
19-Jul	0	2	56	26	16	10	110
20-Jul	0	10	16		29	0	55
21-Jul	2	5	0	0	0	0	7
22-Jul	0	4	63		3	1	71
23-Jul	3	4	0	37	1	0	45
24-Jul		7	6		34	11	58
25-Jul	0	7	0	1	18	0	26
26-Jul	0	0	40		15	1	56
27-Jul	41	7	21	5	1	0	75
28-Jul	6	1	1		0	0	8
29-Jul	4	4	26	8	1	1	44
Total	359	541	623	469	431	58	2481
%	14.5	21.8	25.1	18.9	17.4	2.3	100.0

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Table 3. Estimated sockeye salmon CPUE by date and station.
Upper Cook Inlet offshore test fish project, 1996.

Date	Station Number						Total
	4	5	6	6.5	7	8	
01-Jul	7.9	12.8	0.0	5.6	0.9	0.8	28.0
02-Jul	0.0	7.3	1.7		0.0	1.6	10.6
03-Jul	0.0	14.4	16.3	2.4	0.9	0.0	34.0
04-Jul	58.0	36.3	3.2		5.6	0.8	103.9
05-Jul	31.4	16.3	39.3	17.4	14.8	6.3	125.5
06-Jul	3.9	7.9	10.4		26.2	3.2	51.6
07-Jul	18.0	0.8	3.7	0.0	0.0	0.8	23.3
08-Jul	7.2	3.3	1.6		0.8	0.0	12.9
09-Jul	54.7	56.0	11.3	4.7	0.0	0.0	126.7
10-Jul	2.1	7.9	0.0		0.8	1.6	12.4
11-Jul	16.7	12.9	0.0	42.7	21.3	0.0	93.6
12-Jul	10.4	10.7	35.1		1.5	2.2	59.9
13-Jul	5.8	28.0	23.1	50.0			106.9
14-Jul	0.8	51.5	17.8		2.4	4.0	76.5
15-Jul	1.7	32.0	39.0	55.5	49.9	4.9	183.0
16-Jul	0.0	5.6	2.5		70.5	0.0	78.6
17-Jul	0.0	34.5	48.2	61.7	12.5	0.0	156.9
18-Jul	0.0	5.3	5.5		27.0	0.8	38.6
19-Jul	0.0	1.5	36.5	19.5	11.7	7.8	77.0
20-Jul	0.0	7.7	12.9		22.3	0.0	42.9
21-Jul	1.5	4.1	0.0	0.0	0.0	0.0	5.6
22-Jul	0.0	3.1	41.5		2.4	0.8	47.8
23-Jul	2.4	3.4	0.0	26.4	0.8	0.0	33.0
24-Jul		5.9	4.5		22.9	8.5	41.8
25-Jul	0.0	5.3	0.0	0.8	11.7	0.0	17.8
26-Jul	0.0	0.0	28.2		10.7	0.8	39.7
27-Jul	28.2	5.6	15.1	3.7	0.8	0.0	53.4
28-Jul	4.9	1.6	0.8		0.0	0.0	7.3
29-Jul	3.1	3.3	19.5	6.4	0.8	0.8	34.0
Total	258.7	384.9	417.6	296.8	319.2	45.9	1723.2
%	15.0	22.3	24.2	17.2	18.5	2.7	100.0

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Table 4. Mean date of the sockeye salmon run across Anchor Point transect, Upper Cook Inlet offshore test fish project, 1979-1995.

Year	Mean Date ^a	
	Coded	Calendar
1979	18.4	July 11
1980	22.7	July 15
1981	13.2	July 06
1982	24.2	July 17
1983	22.6	July 15
1984	18.4	July 11
1985	22.7	July 15
1986	23.0	July 16
1987	25.7	July 18
1988	20.6	July 13
1989	21.6	July 14
1990	25.6	July 18
1991	24.3	July 17
1992	24.3	July 17
1993	21.4	July 14
1994	26.2	July 19
1995	22.1	July 15
1996	20.4	July 13
1979-1995	22.1	July 15

^a Day (1) = June 24. File: otf96t4.doc

Table 5. The 1996 Upper Cook Inlet commercial salmon harvest.

Day	Harvest	Cululative Harvest	Cululative Percent
603	1732	1732	0.04
605	721	2453	0.06
607	156	2609	0.07
610	475	3084	0.08
612	907	3991	0.1
614	989	4980	0.13
617	540	5520	0.14
619	385	5905	0.15
621	452	6357	0.16
624	295	6652	0.17
628	86786	93438	2.4
701	143399	236837	6.09
702	28113	264950	6.81
705	303944	568894	14.63
708	254482	823376	21.17
709	24973	848349	21.82
711	95512	943861	24.27
712	112978	1056839	27.18
714	165671	1222510	31.44
715	642534	1865044	47.96
716	121009	1986053	51.07
717	135031	2121084	54.54
719	537724	2658808	68.37
720	129727	2788535	71.71
721	125935	2914470	74.95
722	293665	3208135	82.5
723	9941	3218076	82.75
725	146335	3364411	86.52
726	205407	3569818	91.8
727	88905	3658723	94.08
728	49493	3708216	95.36
729	84536	3792752	97.53
731	3919	3796671	97.63
802	42105	3838776	98.71
805	26199	3864975	99.39
807	2962	3867937	99.46
809	9776	3877713	99.72
812	5861	3883574	99.87
814	1176	3884750	99.9
816	989	3885739	99.92
819	1637	3887376	99.96
821	345	3887721	99.97
823	735	3888456	99.99
826	134	3888590	100
828	50	3888640	100
830	24	3888664	100
902	39	3888703	100
904	4	3888707	100
906	71	3888778	100
909	0	3888778	100

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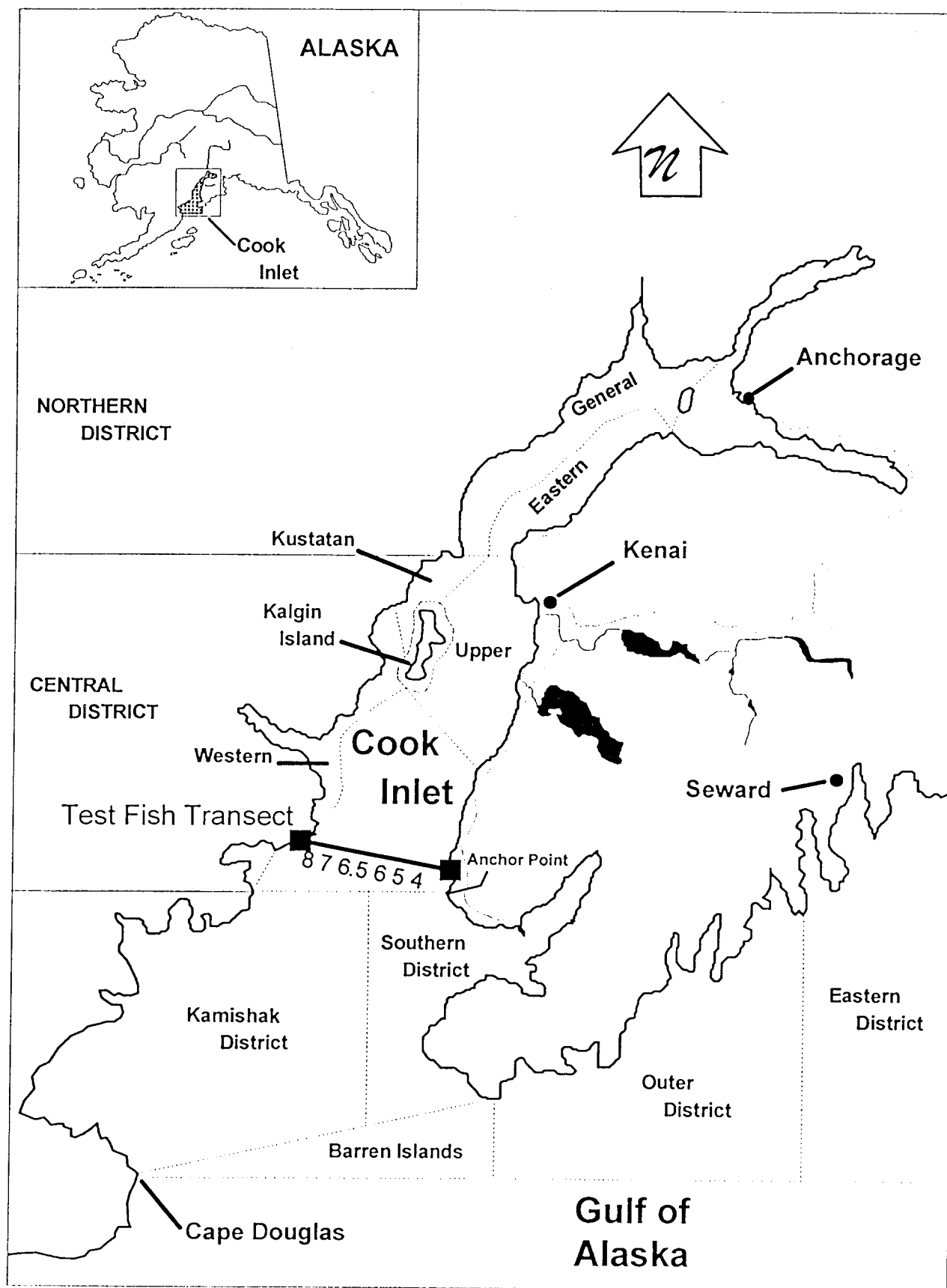


Figure 1. Location of fishing districts and offshore test fish transect in Cook Inlet, Alaska, 1996.

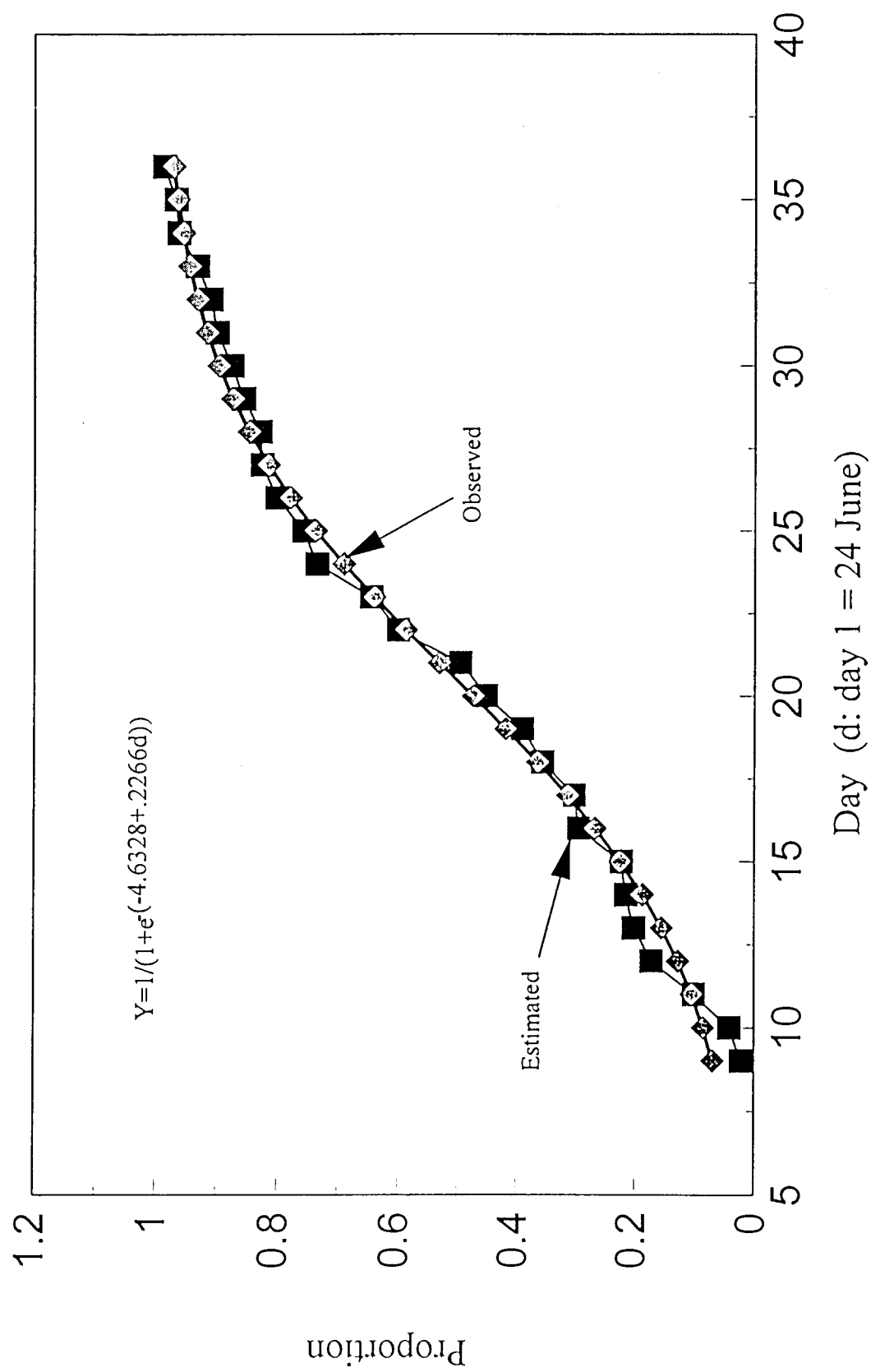


Figure 2. Cumulative proportions estimated for the sockeye salmon return to Upper Cook Inlet, Alaska, 1996.

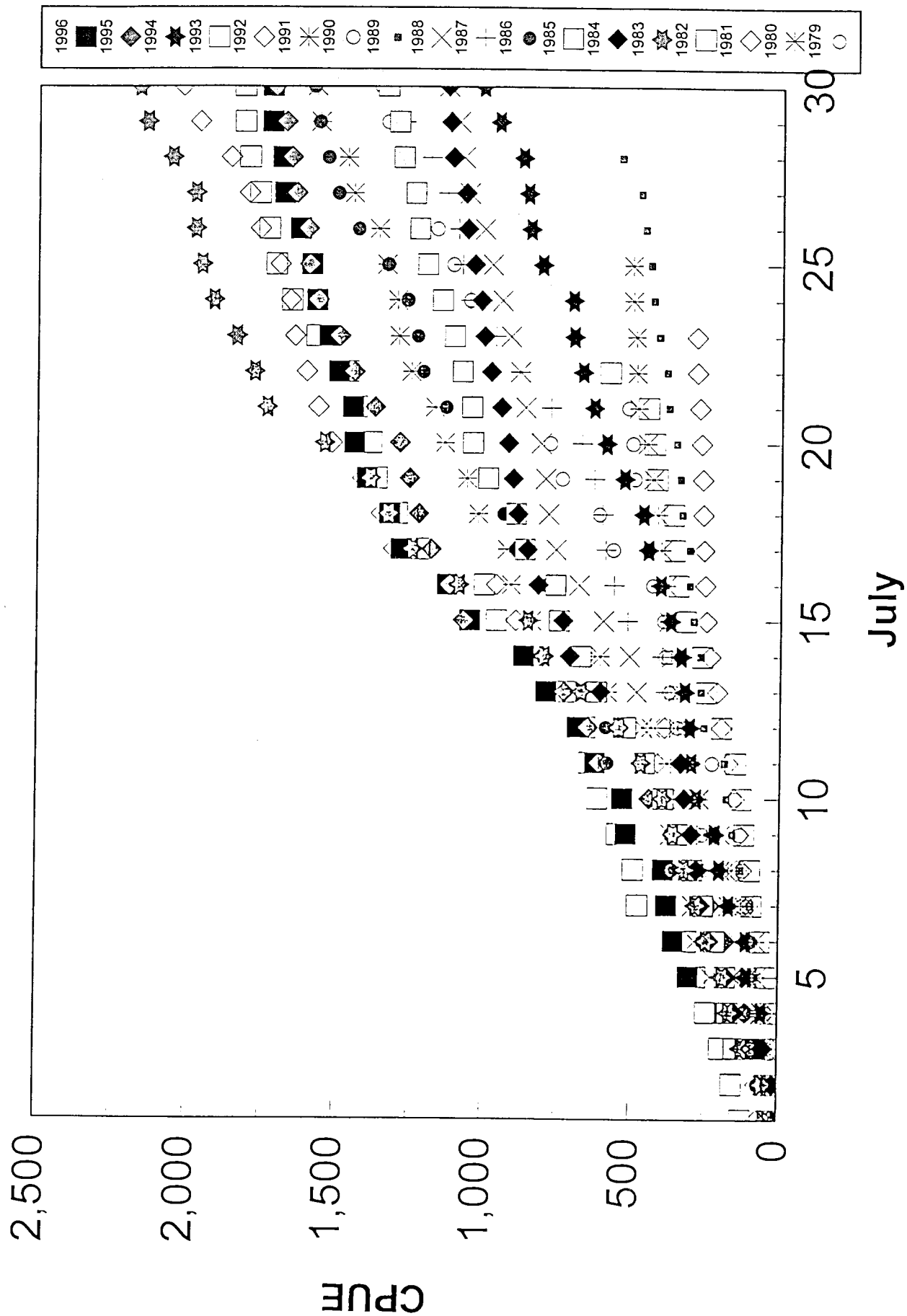


Figure 3. Cumulative CPUE indices at the offshore test fish site, Upper Cook Inlet, Alaska 1979-1996.

Appendix A1. Summary of pink salmon fishing effort,
daily and cumulative catch, and daily and
cumulative CPUE, Upper Cook Inlet offshore
test fish project, 1996.

Date	Number of Stations	Mean Fishing Time (min)	Catch		CPUE	
			Daily	Cumul.	Daily	Cumul.
01-Jul	6	209.5	0	0	0.0	0.0
02-Jul	5	181.0	0	0	0.0	0.0
03-Jul	6	222.5	0	0	0.0	0.0
04-Jul	5	196.5	1	1	0.7	0.7
05-Jul	6	244.5	0	1	0.0	0.7
06-Jul	5	191.0	0	1	0.0	0.7
07-Jul	6	212.5	0	1	0.0	0.7
08-Jul	5	184.0	0	1	0.0	0.7
09-Jul	6	243.5	1	2	0.7	1.4
10-Jul	5	186.0	2	4	2.1	3.5
11-Jul	6	245.0	0	4	0.0	3.5
12-Jul	5	204.5	1	5	0.6	4.1
13-Jul	4	162.0	0	5	0.0	4.1
14-Jul	5	204.5	4	9	2.5	6.6
15-Jul	6	262.0	2	11	1.1	7.7
16-Jul	5	177.5	2	13	1.6	9.3
17-Jul	6	263.5	12	25	6.9	16.3
18-Jul	5	193.5	5	30	3.8	20.1
19-Jul	6	241.0	12	42	8.4	28.5
20-Jul	5	187.5	1	43	0.8	29.3
21-Jul	6	216.5	2	45	1.7	30.9
22-Jul	5	192.5	11	56	8.3	39.2
23-Jul	6	225.0	5	61	3.7	42.9
24-Jul	4	158.0	13	74	9.0	51.9
25-Jul	6	227.0	10	84	6.8	58.7
26-Jul	5	169.0	16	100	11.3	70.0
27-Jul	6	236.0	10	110	7.1	77.1
28-Jul	5	164.5	3	113	2.5	79.6
29-Jul	6	224.0	6	119	4.8	84.3

File: otf96a1.doc

Appendix A2. Estimated pink salmon catch by date and station, Upper Cook Inlet offshore test fish project, 1996.

Date	Station Number						Total
	4	5	6	6.5	7	8	
01-Jul	0	0	0	0	0	0	0
02-Jul	0	0	0		0	0	0
03-Jul	0	0	0	0	0	0	0
04-Jul	1	0	0		0	0	1
05-Jul	0	0	0	0	0	0	0
06-Jul	0	0	0		0	0	0
07-Jul	0	0	0	0	0	0	0
08-Jul	0	0	0		0	0	0
09-Jul	1	0	0	0	0	0	1
10-Jul	2	0	0		0	0	2
11-Jul	0	0	0	0	0	0	0
12-Jul	0	0	1		0	0	1
13-Jul	0	0	0	0			0
14-Jul	0	3	1		0	0	4
15-Jul	0	0	0	2	0	0	2
16-Jul	0	2	0		0	0	2
17-Jul	0	1	4	6	1	0	12
18-Jul	2	3	0		0	0	5
19-Jul	0	1	6	4	1	0	12
20-Jul	1	0	0		0	0	1
21-Jul	0	1	1	0	0	0	2
22-Jul	6	1	4		0	0	11
23-Jul	0	0	1	2	2	0	5
24-Jul		0	0		10	3	13
25-Jul	0	2	0	1	7	0	10
26-Jul	0	0	8		8	0	16
27-Jul	1	0	7	2	0	0	10
28-Jul	0	3	0		0	0	3
29-Jul	1	1	1	1	2	0	6
Total	15	18	34	18	31	3	119
%	12.6	15.1	28.6	15.1	26.1	2.5	100.0

File: ot96a1.doc

Appendix A3. Estimated pink salmon CPUE by date and station.
Upper Cook Inlet offshore test fish project, 1996.

Date	Station Number						Total
	4	5	6	6.5	7	8	
01-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0
02-Jul	0.0	0.0	0.0		0.0	0.0	0.0
03-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0
04-Jul	0.7	0.0	0.0		0.0	0.0	0.7
05-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0
06-Jul	0.0	0.0	0.0		0.0	0.0	0.0
07-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0
08-Jul	0.0	0.0	0.0		0.0	0.0	0.0
09-Jul	0.7	0.0	0.0	0.0	0.0	0.0	0.7
10-Jul	2.1	0.0	0.0		0.0	0.0	2.1
11-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12-Jul	0.0	0.0	0.6		0.0	0.0	0.6
13-Jul	0.0	0.0	0.0	0.0			0.0
14-Jul	0.0	1.9	0.6		0.0	0.0	2.5
15-Jul	0.0	0.0	0.0	1.1	0.0	0.0	1.1
16-Jul	0.0	1.6	0.0		0.0	0.0	1.6
17-Jul	0.0	0.7	2.1	3.4	0.7	0.0	6.9
18-Jul	1.6	2.2	0.0		0.0	0.0	3.8
19-Jul	0.0	0.8	3.9	3.0	0.7	0.0	8.4
20-Jul	0.8	0.0	0.0		0.0	0.0	0.8
21-Jul	0.0	0.8	0.8	0.0	0.0	0.0	1.7
22-Jul	4.9	0.8	2.6		0.0	0.0	8.3
23-Jul	0.0	0.0	0.8	1.4	1.5	0.0	3.7
24-Jul		0.0	0.0		6.7	2.3	9.0
25-Jul	0.0	1.5	0.0	0.8	4.5	0.0	6.8
26-Jul	0.0	0.0	5.6		5.7	0.0	11.3
27-Jul	0.7	0.0	5.0	1.4	0.0	0.0	7.1
28-Jul	0.0	2.5	0.0		0.0	0.0	2.5
29-Jul	0.8	0.8	0.7	0.8	1.6	0.0	4.8
Total	12.2	13.6	22.8	11.9	21.5	2.3	84.3
%	14.5	16.1	27.1	14.1	25.5	2.7	100.0

File: otf96a1.doc

Appendix B1. Summary of chum salmon fishing effort, daily and cumulative catch, and daily and cumulative CPUE. Upper Cook Inlet offshore test fish project, 1996.

Date	Number of Stations	Mean Fishing Time (min)	Catch		CPUE	
			Daily	Cumul.	Daily	Cumul.
01-Jul	6	209.5	5	5	9.3	9.3
02-Jul	5	181.0	3	8	2.5	11.8
03-Jul	6	222.5	8	16	6.1	17.9
04-Jul	5	196.5	18	34	13.2	31.1
05-Jul	6	244.5	18	52	12.6	43.8
06-Jul	5	191.0	52	104	9.4	53.2
07-Jul	6	212.5	14	118	11.8	65.0
08-Jul	5	184.0	3	121	2.4	67.4
09-Jul	6	243.5	8	129	5.4	72.8
10-Jul	5	186.0	3	132	2.6	75.4
11-Jul	6	245.0	15	147	10.7	86.1
12-Jul	5	204.5	21	168	13.0	99.1
13-Jul	4	162.0	11	179	7.5	106.6
14-Jul	5	204.5	10	189	6.4	113.0
15-Jul	6	262.0	74	263	44.9	157.9
16-Jul	5	177.5	25	288	21.8	179.7
17-Jul	6	263.5	42	330	23.6	203.2
18-Jul	5	193.5	7	337	5.2	208.5
19-Jul	6	241.0	31	368	21.2	229.7
20-Jul	5	187.5	13	381	10.1	239.8
21-Jul	6	216.5	2	383	1.7	241.5
22-Jul	5	192.5	13	396	8.7	250.2
23-Jul	6	225.0	5	401	3.8	254.0
24-Jul	4	158.0	15	416	11.2	265.2
25-Jul	6	227.0	7	423	4.9	270.1
26-Jul	5	169.0	21	444	14.8	284.9
27-Jul	6	236.0	37	481	26.7	311.6
28-Jul	5	164.5	2	483	1.6	313.2
29-Jul	6	224.0	8	491	6.3	319.4

File: ot96b1.doc

Appendix B2. Estimated chum salmon catch by date and station, Upper Cook Inlet offshore test fish project, 1996.

Date	Station Number						Total
	4	5	6	6.5	7	8	
01-Jul	0	1	0	0	1	3	5
02-Jul	1	0	2		0	0	3
03-Jul	0	4	4	0	0	0	8
04-Jul	1	11	5		1	0	18
05-Jul	3	4	8	2	1	0	18
06-Jul	0	46	5		1	0	52
07-Jul	4	7	2	0	0	1	14
08-Jul	0	2	1		0	0	3
09-Jul	0	6	1	1	0	0	8
10-Jul	1	0	2		0	0	3
11-Jul	3	1	3	2	5	1	15
12-Jul	0	0	19		1	1	21
13-Jul	1	2	3	5			11
14-Jul	0	6	4		0	0	10
15-Jul	0	1	7	32	34	0	74
16-Jul	0	2	0		23	0	25
17-Jul	0	2	25	14	1	0	42
18-Jul	0	1	3		2	1	7
19-Jul	1	0	18	0	12	0	31
20-Jul	1	1	2		9	0	13
21-Jul	0	1	0	1	0	0	2
22-Jul	0	0	12		1	0	13
23-Jul	0	2	0	3	0	0	5
24-Jul		4	0		6	5	15
25-Jul	0	0	0	3	4	0	7
26-Jul	0	0	10		11	0	21
27-Jul	6	4	11	10	3	3	37
28-Jul	2	0	0		0	0	2
29-Jul	2	1	2	2	1	0	8
Total	26	109	149	75	117	15	491
%	5.3	22.2	30.3	15.3	23.8	3.1	100.0

File: otf96b1.doc

Appendix B3. Estimated chum salmon CPUE by date and station.
Upper Cook Inlet offshore test fish project, 1996.

Date	Station Number						Total
	4	5	6	6.5	7	8	
01-Jul	0.0	1.0	0.0	0.0	0.9	7.4	9.3
02-Jul	0.8	0.0	1.7		0.0	0.0	2.5
03-Jul	0.0	3.0	3.1	0.0	0.0	0.0	6.1
04-Jul	0.7	7.7	4.0		0.8	0.0	13.2
05-Jul	2.0	3.1	5.3	1.5	0.7	0.0	12.6
06-Jul	0.0	4.7	4.0		0.7	0.0	9.4
07-Jul	3.0	5.5	2.4	0.0	0.0	0.8	11.8
08-Jul	0.0	1.6	0.8		0.0	0.0	2.4
09-Jul	0.0	3.9	0.7	0.8	0.0	0.0	5.4
10-Jul	1.0	0.0	1.6		0.0	0.0	2.6
11-Jul	2.2	0.8	2.3	1.2	3.4	0.8	10.7
12-Jul	0.0	0.0	11.5		0.8	0.8	13.0
13-Jul	1.1	1.2	2.1	3.1			7.5
14-Jul	0.0	3.9	2.5		0.0	0.0	6.4
15-Jul	0.0	0.7	4.9	17.9	21.4	0.0	44.9
16-Jul	0.0	1.6	0.0		20.2	0.0	21.8
17-Jul	0.0	1.4	13.4	8.0	0.7	0.0	23.6
18-Jul	0.0	0.8	2.3		1.4	0.8	5.2
19-Jul	0.8	0.0	11.7	0.0	8.7	0.0	21.2
20-Jul	0.8	0.8	1.6		6.9	0.0	10.1
21-Jul	0.0	0.8	0.0	0.8	0.0	0.0	1.7
22-Jul	0.0	0.0	7.9		0.8	0.0	8.7
23-Jul	0.0	1.7	0.0	2.1	0.0	0.0	3.8
24-Jul		3.4	0.0		4.0	3.8	11.2
25-Jul	0.0	0.0	0.0	2.3	2.6	0.0	4.9
26-Jul	0.0	0.0	7.0		7.8	0.0	14.8
27-Jul	4.1	2.4	7.9	7.4	2.5	2.4	26.7
28-Jul	1.6	0.0	0.0		0.0	0.0	1.6
29-Jul	1.5	0.8	1.5	1.6	0.8	0.0	6.3
Total	19.7	50.8	100.2	46.7	85.2	16.8	319.4
%	6.2	15.9	31.4	14.6	26.7	5.3	100.0

File: otf96b1.doc

Appendix C1. Summary of coho salmon fishing effort.
daily and cumulative catch, and daily and
cumulative CPUE, Upper Cook Inlet offshore
test fish project, 1996.

Date	Number of Stations	Mean Fishing Time (min)	Catch		CPUE	
			Daily	Cumul.	Daily	Cumul.
01-Jul	6	209.5	2	2	1.8	1.8
02-Jul	5	181.0	2	4	1.6	3.4
03-Jul	6	222.5	3	7	2.3	5.7
04-Jul	5	196.5	5	12	3.5	9.2
05-Jul	6	244.5	17	29	11.9	21.1
06-Jul	5	191.0	4	33	3.1	24.2
07-Jul	6	212.5	17	50	16.4	40.6
08-Jul	5	184.0	1	51	0.8	41.5
09-Jul	6	243.5	25	76	16.8	58.3
10-Jul	5	186.0	4	80	3.1	61.4
11-Jul	6	245.0	60	140	42.4	103.8
12-Jul	5	204.5	92	232	59.4	163.2
13-Jul	4	162.0	59	291	41.2	204.4
14-Jul	5	204.5	41	332	26.5	230.9
15-Jul	6	262.0	65	397	41.6	272.5
16-Jul	5	177.5	45	442	39.6	312.1
17-Jul	6	263.5	62	504	38.5	350.7
18-Jul	5	193.5	18	522	13.3	364.0
19-Jul	6	241.0	39	561	26.6	390.6
20-Jul	5	187.5	7	568	5.4	396.0
21-Jul	6	216.5	2	570	1.6	397.6
22-Jul	5	192.5	27	597	18.2	415.8
23-Jul	6	225.0	22	619	15.8	431.6
24-Jul	4	158.0	18	637	13.3	444.9
25-Jul	6	227.0	32	669	22.6	467.5
26-Jul	5	169.0	17	686	12.0	479.5
27-Jul	6	236.0	45	731	32.8	512.3
28-Jul	5	164.5	5	736	4.1	516.4
29-Jul	6	224.0	22	758	17.4	533.8

File: ot96cl.doc

Appendix C2. Estimated coho salmon catch by date and station, Upper Cook Inlet offshore test fish project, 1996.

Date	Station Number						Total
	4	5	6	6.5	7	8	
01-Jul	1	1	0	0	0	0	2
02-Jul	0	1	1		0	0	2
03-Jul	0	0	2	1	0	0	3
04-Jul	0	5	0		0	0	5
05-Jul	2	0	7	0	7	1	17
06-Jul	0	2	0		1	1	4
07-Jul	1	9	7	0	0	0	17
08-Jul	0	0	0		1	0	1
09-Jul	5	14	3	3	0	0	25
10-Jul	0	4	0		0	0	4
11-Jul	5	13	4	7	31	0	60
12-Jul	0	2	69		19	2	92
13-Jul	6	33	8	12			59
14-Jul	0	20	20		1	0	41
15-Jul	0	24	6	16	15	4	65
16-Jul	0	0	1		44	0	45
17-Jul	1	16	19	17	9	0	62
18-Jul	0	10	2		6	0	18
19-Jul	0	0	23	7	9	0	39
20-Jul	0	3	1		3	0	7
21-Jul	0	0	0	0	1	1	2
22-Jul	0	1	24		2	0	27
23-Jul	0	0	0	19	3	0	22
24-Jul		8	0		2	8	18
25-Jul	0	9	2	3	17	1	32
26-Jul	0	0	5		12	0	17
27-Jul	12	2	16	15	0	0	45
28-Jul	0	3	0		0	2	5
29-Jul	1	2	4	11	3	1	22
Total	34	182	224	111	186	21	758
%	4.5	24.0	29.6	14.6	24.5	2.8	100.0

File: otf96cl.doc

Appendix C3. Estimated coho salmon CPUE by date and station.
Upper Cook Inlet offshore test fish project, 1996.

Date	Station Number						Total
	4	5	6	6.5	7	8	
01-Jul	0.8	1.0	0.0	0.0	0.0	0.0	1.8
02-Jul	0.0	0.8	0.8		0.0	0.0	1.6
03-Jul	0.0	0.0	1.5	0.8	0.0	0.0	2.3
04-Jul	0.0	3.5	0.0		0.0	0.0	3.5
05-Jul	1.4	0.0	4.6	0.0	5.1	0.8	11.9
06-Jul	0.0	1.6	0.0		0.7	0.8	3.1
07-Jul	0.7	7.1	8.6	0.0	0.0	0.0	16.4
08-Jul	0.0	0.0	0.0		0.8	0.0	0.8
09-Jul	3.3	9.1	2.1	2.3	0.0	0.0	16.8
10-Jul	0.0	3.1	0.0		0.0	0.0	3.1
11-Jul	3.8	9.8	3.1	4.4	21.3	0.0	42.4
12-Jul	0.0	1.5	41.8		14.6	1.5	59.4
13-Jul	7.0	21.0	5.7	7.5			41.2
14-Jul	0.0	13.0	12.7		0.8	0.0	26.5
15-Jul	0.0	16.0	4.1	8.9	9.4	3.2	41.6
16-Jul	0.0	0.0	0.8		38.8	0.0	39.6
17-Jul	0.8	11.2	10.1	9.8	6.6	0.0	38.5
18-Jul	0.0	7.5	1.5		4.3	0.0	13.3
19-Jul	0.0	0.0	14.9	5.2	6.5	0.0	26.6
20-Jul	0.0	2.3	0.8		2.3	0.0	5.4
21-Jul	0.0	0.0	0.0	0.0	0.8	0.8	1.6
22-Jul	0.0	0.8	15.8		1.6	0.0	18.2
23-Jul	0.0	0.0	0.0	13.5	2.3	0.0	15.8
24-Jul		6.8	0.0		0.3	6.2	13.3
25-Jul	0.0	6.9	1.6	2.3	11.0	0.8	22.6
26-Jul	0.0	0.0	3.5		8.5	0.0	12.0
27-Jul	8.2	1.6	11.5	11.5	0.0	0.0	32.8
28-Jul	0.0	2.5	0.0		0.0	1.6	4.1
29-Jul	0.8	1.6	3.0	8.8	2.4	0.8	17.4
Total	26.9	128.6	148.5	75.0	138.2	16.5	533.8
%	5.0	24.1	27.8	14.1	25.9	3.1	100.0

File: ot96cl.doc

Appendix D1. Summary of chinook salmon fishing effort, daily and cumulative catch, and daily and cumulative CPUE. Upper Cook Inlet offshore test fish project, 1996.

Date	Number of Stations	Mean Fishing Time (min)	Catch		CPUE	
			Daily	Cumul.	Daily	Cumul.
01-Jul	6	209.5	0	0	0.0	0.0
02-Jul	5	181.0	0	0	0.0	0.0
03-Jul	6	222.5	0	0	0.0	0.0
04-Jul	5	196.5	0	0	0.0	0.0
05-Jul	6	244.5	0	0	0.0	0.0
06-Jul	5	191.0	0	0	0.0	0.0
07-Jul	6	212.5	0	0	0.0	0.0
08-Jul	5	184.0	1	1	0.8	0.8
09-Jul	6	243.5	1	2	0.7	1.5
10-Jul	5	186.0	0	2	0.0	1.5
11-Jul	6	245.0	0	2	0.0	1.5
12-Jul	5	204.5	0	2	0.0	1.5
13-Jul	4	162.0	0	2	0.0	1.5
14-Jul	5	204.5	0	2	0.0	1.5
15-Jul	6	262.0	0	2	0.0	1.5
16-Jul	5	177.5	0	2	0.0	1.5
17-Jul	6	263.5	0	2	0.0	1.5
18-Jul	5	193.5	0	2	0.0	1.5
19-Jul	6	241.0	0	2	0.0	1.5
20-Jul	5	187.5	0	2	0.0	1.5
21-Jul	6	216.5	1	3	0.8	2.3
22-Jul	5	192.5	0	3	0.0	2.3
23-Jul	6	225.0	0	3	0.0	2.3
24-Jul	4	158.0	0	3	0.0	2.3
25-Jul	6	227.0	0	3	0.0	2.3
26-Jul	5	169.0	0	3	0.0	2.3
27-Jul	6	236.0	0	3	0.0	2.3
28-Jul	5	164.5	0	3	0.0	2.3
29-Jul	6	224.0	0	3	0.0	2.3

File: otf96d1.doc

Appendix D2. Estimated chinook salmon catch by date and station. Upper Cook Inlet offshore test fish project, 1996.

Date	Station Number						Total
	4	5	6	6.5	7	8	
01-Jul	0	0	0	0	0	0	0
02-Jul	0	0	0		0	0	0
03-Jul	0	0	0	0	0	0	0
04-Jul	0	0	0		0	0	0
05-Jul	0	0	0	0	0	0	0
06-Jul	0	0	0		0	0	0
07-Jul	0	0	0	0	0	0	0
08-Jul	0	0	1		0	0	1
09-Jul	1	0	0	0	0	0	1
10-Jul	0	0	0		0	0	0
11-Jul	0	0	0	0	0	0	0
12-Jul	0	0	0		0	0	0
13-Jul	0	0	0	0			0
14-Jul	0	0	0		0	0	0
15-Jul	0	0	0	0	0	0	0
16-Jul	0	0	0		0	0	0
17-Jul	0	0	0	0	0	0	0
18-Jul	0	0	0		0	0	0
19-Jul	0	0	0	0	0	0	0
20-Jul	0	0	0		0	0	0
21-Jul	0	0	1	0	0	0	1
22-Jul	0	0	0		0	0	0
23-Jul	0	0	0	0	0	0	0
24-Jul		0	0		0	0	0
25-Jul	0	0	0	0	0	0	0
26-Jul	0	0	0		0	0	0
27-Jul	0	0	0	0	0	0	0
28-Jul	0	0	0		0	0	0
29-Jul	0	0	0	0	0	0	0
Total	1	0	2	0	0	0	3
%	33.3	0.0	66.7	0.0	0.0	0.0	100.0

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Appendix D3. Estimated chinook salmon CPUE by date and station.
Upper Cook Inlet offshore test fish project, 1996.

Date	Station Number						Total
	4	5	6	6.5	7	8	
01-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0
02-Jul	0.0	0.0	0.0		0.0	0.0	0.0
03-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0
04-Jul	0.0	0.0	0.0		0.0	0.0	0.0
05-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0
06-Jul	0.0	0.0	0.0		0.0	0.0	0.0
07-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0
08-Jul	0.0	0.0	0.8		0.0	0.0	0.8
09-Jul	0.7	0.0	0.0	0.0	0.0	0.0	0.7
10-Jul	0.0	0.0	0.0		0.0	0.0	0.0
11-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12-Jul	0.0	0.0	0.0		0.0	0.0	0.0
13-Jul	0.0	0.0	0.0	0.0			0.0
14-Jul	0.0	0.0	0.0		0.0	0.0	0.0
15-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16-Jul	0.0	0.0	0.0		0.0	0.0	0.0
17-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18-Jul	0.0	0.0	0.0		0.0	0.0	0.0
19-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20-Jul	0.0	0.0	0.0		0.0	0.0	0.0
21-Jul	0.0	0.0	0.8	0.0	0.0	0.0	0.8
22-Jul	0.0	0.0	0.0		0.0	0.0	0.0
23-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24-Jul		0.0	0.0		0.0	0.0	0.0
25-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26-Jul	0.0	0.0	0.0		0.0	0.0	0.0
27-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28-Jul	0.0	0.0	0.0		0.0	0.0	0.0
29-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.7	0.0	1.6	0.0	0.0	0.0	2.3
%	28.8	0.0	71.2	0.0	0.0	0.0	100.0

File: ot96d1.doc

Appendix E1. Entry pattern of sockeye salmon into Upper Cook Inlet, Alaska,
1996, estimated from daily CPUE measured at the latitude of Anchor Point

Day	Date	Input Y	Estimated Y	Residual	Change in input Y	Change in estimated Y
8	701	0.016	0.0563	-0.0402		
9	702	0.0221	0.0696	-0.0475	0.0061	0.0133
10	703	0.0416	0.0858	-0.0442	0.0195	0.0162
11	704	0.1011	0.1053	-0.0042	0.0595	0.0195
12	705	0.173	0.1286	0.0443	0.0719	0.0233
13	706	0.2025	0.1562	0.0463	0.0295	0.0276
14	707	0.2158	0.1885	0.0274	0.0133	0.0322
15	708	0.2232	0.2256	-0.0024	0.0074	0.0371
16	709	0.2958	0.2676	0.0282	0.0726	0.042
17	710	0.3029	0.3143	-0.0114	0.0071	0.0467
18	711	0.3565	0.365	-0.0085	0.0536	0.0508
19	712	0.3908	0.419	-0.0282	0.0343	0.0539
20	713	0.452	0.475	-0.0229	0.0612	0.056
21	714	0.4959	0.5315	-0.0357	0.0438	0.0566
22	715	0.6007	0.5873	0.0133	0.1048	0.0558
23	716	0.6457	0.641	0.0047	0.045	0.0536
24	717	0.7355	0.6913	0.0442	0.0899	0.0503
25	718	0.7576	0.7375	0.0202	0.0221	0.0462
26	719	0.8017	0.7789	0.0228	0.0441	0.0415
27	720	0.8263	0.8155	0.0108	0.0246	0.0366
28	721	0.8295	0.8472	-0.0177	0.0032	0.0317
29	722	0.8569	0.8743	-0.0173	0.0274	0.0271
30	723	0.8758	0.8972	-0.0213	0.0189	0.0229
31	724	0.8998	0.9163	-0.0165	0.0239	0.0191
32	725	0.91	0.9321	-0.0221	0.0102	0.0158
33	726	0.9327	0.9451	-0.0124	0.0228	0.013
34	727	0.9633	0.9557	0.0076	0.0306	0.0106
35	728	0.9675	0.9644	0.0031	0.0042	0.0087
36	729	0.987	0.9714	0.0155	0.0194	0.007

File:otf96e1.xls

Appendix F. Chemical and physical observations made in Upper Cook Inlet, Alaska during the conduct of the 1996 offshore test fish project.

Date	Station	Air Temp. (c)	Water Temp. (c)	Wind Vel. (knots)	Wind Dir^	Tide Stage~	Salinity (ppt)	Water Depth (f)	Secchi (m)
01-Jul	4	17	10	0	0	3	31.6	24	4.5
	5	17	10	0	0	4	31.3	37	5
	6	10	11	0	0	4	30.9	49	2
	6.5	13	10	7	6	4	31.3	42	3
	7	16	10	5	6	4	30.9	48	3.5
	8	17	10	5	6	4	31.1	33	2.5
	8	11	10	0	0	3	30.9	32	2.5
	7	13	10	5	2	3	30.8	42	3
02-Jul	6	15	10	5	2	3	31.5	46	3.5
	5	15	10	0	0	3	31.1	35	4.5
	4	14	10	0	0	3	31	23	4.5
	4	17	10	0	0	3	31.6	24	5
	5	17	9	0	0	3	31.2	36	4
	6	16	13	0	0	3	30.5	46	1.5
	6.5	14	11	0	0	4	31.1	47	1.5
	7	15	11	5	6	4	30.8	45	1.5
03-Jul	8	17	10	5	6	4	30.5	32	2
	8	11	10	15	4	4	30.4	30	2
	7	12	10	15	4	3	30.6	45	2
	6	13	10	15	4	3	31.8	47	3.5
	5	13	9	15	4	3	31.5	36	4
	4	17	10	15	5	3	30.1	24	7.5
	4	12	8.5	5	2	3	31.5	24	5
	5	13	8.5	5	2	3	31.6	35	5
04-Jul	6	13	9.8	10	1	3	30.4	44	2
	6.5	14	9.8	15	1	3	30.5	41	2
	7	13	9.9	15	1	4	30.4	46	1.5
	8	12	9.8	15	1	4	30.6	31	2
	8	11	9.7	15	8	4	30.7	30	2
	7	12	9.1	15	8	4	31.1	49	3
	6	12	8.8	15	8	1	31.4	47	3.5
	5	12	8.7	20	1	3	31.4	36	4
05-Jul	4	12	8.5	20	8	3	31.6	24	5
	4	11	8.6	7	8	1	31.8	24	11
	5	12	8.8	0	0	3	31.4	34	6
	6	13	9.5	5	6	3	31	48	4
	6.5	14	10	5	6	3	30.4	43	3
	7	14	9.9	10	8	3	30.3	41	2
	8	14	10	12	8	2	30.5	30	1

-continued-

Appendix F. (p 2 of 4)

Date	Station	Air Temp. (c)	Water Temp. (c)	Wind Vel. (knots)	Wind Dir^	Tide Stage~	Salinity (ppt)	Water Depth (f)	Secchi (m)
08-Jul	8	11	9.8	5	2	4	30.5	31	1
	7	12	10	5	4	4	30	45	2
	6	12	9.8	5	4	4	30.4	49	2
	5	13	8.9	0	0	4	31.3	37	8
	4	15	8.7	0	0	1	31.6	26	12
09-Jul	4	11	8.8	15	2	4	31.4	25	6
	5	12	8.7	15	2	4	31.4	38	6
	6	13	9	10	8	1	31.3	48	5
	6.5	14	9.9	5	1	3	30.5	43	3
	7	13	10	5	1	3	30.4	44	2
10-Jul	8	13	10.5	5	1	3	30.5	28	2
	8	11	10	5	1	3	30.5	29	1.5
	7	11	10.3	20	1	3	30.2	44	3
	6	11	10	25	1	2	30.2	46	3
	5	11	9.2	25	1	4	31	37	4
11-Jul	4	12	8.9	15	1	4	31.4	25	3.5
	4	11	9.2	5	8	4	31.5	26	9
	5	13	9.1	0	0	4	31.5	37	6.5
	6	12	9.4	0	0	4	30.9	49	4
	6.5	12	9.3	0	0	4	31.2	44	4
12-Jul	7	12	9.8	5	1	1	30.6	46	3.5
	8	12	9.8	5	1	3	31.2	32	3.5
	8	10	10	10	8	3	29.9	32	3
	7	11	10.1	10	8	3	29.8	44	3
	6	11	10	15	8	3	30.3	47	3
13-Jul	5	11	9.2	15	2	2	31.3	38	5.5
	4	12	9.1	15	2	4	31.5	25	6
	4	11	9	30	6	4	31.3	30	5
	5	11	9.6	25	6	4	30.7	37	3.5
	6	12	9.8	25	6	4	30.1	47	3.5
14-Jul	6.5	12	10	30	4	4	30.3	43	3
	8	11	9.9	22	6	3	30	29	2
	7	12	10	28	6	3	30	44	2
	6	12	10	25	6	3	30.2	46	3
	5	12	10.1	18	6	2	30.3	38	4
15-Jul	4	13	9.4	10	6	4	31.6	25	9
	4	15	9.2	0	0	3	31.5	25	7
	5	16	9.7	0	0	2	31	36	4.5
	6	15	9.5	0	0	2	30.8	46	4
	6.5	15	9.7	7	6	4	30.8	43	4
	7	14	10	12	6	4	30.9	47	5

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Appendix F. (p 3 of 4)

Date	Station	Air Temp. (c)	Water Temp. (c)	Wind Vel. (knots)	Wind Dir^	Tide Stage~	Salinity (ppt)	Water Depth (f)	Secchi (m)
15-Jul	8	14	9.9	5	6	1	30.6	30	3
16-Jul	8	11	10	7	4	4	30.4	26	3.5
	7	12	10.2	10	4	4	30.3	46	4
	6	12	10.1	15	4	3	30.6	47	4
	5	12	8.7	10	4	3	31.8	41	9.7
	4	12	9	10	4	3	31.6	25	9
17-Jul	4	11	9.3	0	0	3	31.6	24	8
	5	14	9.5	0	0	3	30.4	45	5
	6	14	9.8	0	0	4	30.8	47	5
	6.5	14	10.1	0	0	4	30.8	43	4
	7	15	11	0	0	4	30.6	42	6
	8	13	10.2	0	0	4	30.2	27	6
18-Jul	8	11	10.5	0	0	4	30.1	28	4
	7	11	9.8	5	6	4	30.9	46	6
	6	11	8.9	5	4	1	30.6	48	10
	5	12	8.9	7	4	3	31.8	37	10
	4	12	8.9	5	4	3	31.9	24	10
19-Jul	4	12	9.2	15	6	3	31.8	23	7.5
	5	12	9.1	15	6	3	31.7	35	8
	6	13	10.3	15	5	3	30.6	47	4
	6.5	12	10.6	15	6	2	30.4	42	3
	7	12	10.4	7	5	4	30.3	45	2.5
	8	11	10.8	10	5	4	30.1	30	2
20-Jul	8	11	10.4	0	0	1	30.2	30	2
	7	11	10.1	0	0	3	30.7	45	3.5
	6	11	9.3	0	0	3	31.4	49	9
	5	11	9.1	0	0	3	31.5	36	8
	4	11	9.3	0	0	3	31.7	25	9
21-Jul	4	12	9.6	0	0	3	31.8	23	10
	5	13	9.7	15	4	3	31.5	31	3.5
	6	13	10.7	15	6	3	30.2	47	2.5
	6.5	13	10.7	17	6	3	30.4	40	3
	7	13	11.2	20	6	3	29.8	44	3.5
	8	12	10.7	20	6	2	30.3	31	2
22-Jul	8	12	10.8	5	4	4	30.2	31	2.5
	7	13	10.9	10	4	4	30	46	4
	6	12	10.8	10	4	4	30.2	47	4
	5	12	9.4	10	4	1	31.8	37	10.5
	4	11	9.5	5	4	3	31.8	25	12.5
23-Jul	4	14	9.4	0	0	2	31.6	24.5	13
	5	14	9.4	0	0	3	31.6	35	9

-continued-

Appendix F. (p 4 of 4)

Date	Station	Air Temp. (c)	Water Temp. (c)	Wind Vel. (knots)	Wind Dir^	Tide Stage~	Salinity (ppt)	Water Depth (f)	Secchi (m)
23-Jul	6	14	11.4	0	0	3	29.9	48	7
	6.5	14	11.3	0	0	3	29.8	41.5	3
	7	15	11	0	0	3	30.3	45	4
	8	15	10.8	0	0	2	30.2	29	4
24-Jul	8	11	11.5	15	8	4	29.2	28.5	3
	7	11	10.6	20	8	4	30.5	45	4
	6	12	9.9	5	4	4	31.3	48	4
	5	12	9.4	5	4	4	31.6	37	9
25-Jul	4	15	9.6	0	0	4	31.7	25	12
	5	14	9.5	0	0	4	31.5	37	11
	6	13	10.2	0	0	4	31	47	7
	6.5	14	11.2	0	0	3	29.7	43	4
26-Jul	7	15	11.4	12	4	3	29.6	45	4.5
	8	14	12.7	15	6	3	29	29	2.5
	8	12	11.1	20	6	3	29.8	29.5	4
	7	12	11.8	15	6	3	28.6	44	4
27-Jul	6	11	12.2	15	6	2	28.5	46	5
	5	12	10	8	6	4	31.5	36	8
	4	13	9.8	0	0	4	31.8	25	10
	4	12	10.4	15	6	4	31.2	24	7
28-Jul	5	12	10.2	20	6	4	31.3	26	6
	6	11	10.6	20	6	4	30.6	48	5.5
	6.5	11	11.2	20	6	1	29.6	43.5	4
	7	11	10.6	20	5	1	30.3	46.5	5
29-Jul	8	11	11	20	5	3	30	29	4.5
	8	11	10.7	20	5	3	30.4	29	3.5
	7	12	11	20	6	3	30.1	43	3
	6	12	11.7	22	6	3	28.4	46	3
29-Jul	5	11	10.5	15	6	2	30.4	36	7
	4	12	10.5	15	6	4	31.3	24	7
	4	11	10.1	5	1	2	31.3	24.5	5.5
	5	12	10.5	5	1	4	30.9	36	4
29-Jul	6	12	10.5	5	1	4	30.8	47	4
	6.5	12	10.4	5	1	4	30.6	44	3
	7	12	10.7	5	1	4	30.2	44	3
	8	11	10.5	5	1	4	30.3	32	2.5

^ Wind direction code 1=north,2=northeast,3=east,4=southeast,
5=south,6=southwest,7=west,8=northwest

~ Tide stage code 1=high,2=low,3=ebb,4=flood

File: otf96f1.doc

Total Run Estimate Based on Offshore Test Fishing Information							
Assume 15 July is mean 50% point of run across transect (On Time)							
Fit of 1996 data to 1979-1995 data							
You need to enter data only in cells with light gray shading.							
You can sort the following list by MSS to rank estimates in order of best fit							
		Estimated Total CPUE					
Year	MSS	Current	Previous Day	Difference	Timing		
1987	0.00039	2,931	2,911	20	Late 2 days		
1991	0.00041	2,629	2,625	4	Late 2 days		
1994	0.00056	2,952	2,910	42	Late 4 days		
1995	0.00064	2,100	2,090	10	On Time		
1983	0.00069	2,184	2,156	28	On Time		
1992	0.00080	2,869	2,934	(65)	Late 2 days		
1990	0.00080	3,529	3,659	(130)	Late 3 days		
1993	0.00118	1,914	1,874	40	Early 1 day		
1986	0.00141	2,183	2,130	53	Late 1 day		
1982	0.00141	2,376	2,316	60	Late 2 days		
1985	0.00248	2,073	2,007	66	On Time		
1988	0.00395	1,746	1,681	65	Early 2 days		
1984	0.00582	1,480	1,417	62	Early 4 days		
1989	0.00799	1,833	1,743	90	On Time		
1979	0.00933	1,358	1,292	66	Early 5 days		
1981	0.03314	1,109	1,035	74	Early 9 days		
1980	0.03588	1,140	1,063	77	Early 9 days		
TOTAL RUN THROUGH		15 July	2,999,529				
Escapement				529,000			
	Above Sonar				360,000		
	Below Sonar				100,000		
	Unassessed (15% of total assessed)				69,000		
Cumulative Catch				1,822,094			
	Daily Drift				353,869		
	Daily Set				274,474		
Residual in District				648,435			
	Drift (40% exploitation)				530,804		
	Set (70% exploitation)				117,632		
1996 cumulative cpue		1,049 through	15 July				

Offshore Test Fishing Total Run Estimates for 1996								
Passage Rate (Total Run to Date/Cumulative CPUE to Date)						2,860	Based on	15 July harvest
Total cpue for season, if 15 July is 50% point:						2,097		
Run Estimate Based on Average Timing (15 July 50% Point)						5,999,058		
Run Estimates Based on Model Results (Fit of Current Year to Past Years)								
		Estimated Total CPUE			Estimated			
Year	MSS	Current	Previous Day	Difference	Total Run			
1987	0.00039	2,931	2,911	20	8,382,195	Late 2 days		
1991	0.00041	2,629	2,625	4	7,519,044	Late 2 days		
1994	0.00056	2,952	2,910	42	8,442,086	Late 4 days		
1995	0.00064	2,100	2,090	10	6,007,507	On Time		
1983	0.00069	2,184	2,156	28	6,247,499	On Time		
1992	0.00080	2,869	2,934	(65)	8,205,955	Late 2 days		
1990	0.00080	3,529	3,659	(130)	10,093,281	Late 3 days		
1993	0.00118	1,914	1,874	40	5,473,754	Early 1 day		
1986	0.00141	2,183	2,130	53	6,242,408	Late 1 day		
1982	0.00141	2,376	2,316	60	6,794,808	Late 2 days		
1985	0.00248	2,073	2,007	66	5,928,454	On Time		
1988	0.00395	1,746	1,681	65	4,994,201	Early 2 days		
1984	0.00582	1,480	1,417	62	4,232,269	Early 4 days		
1989	0.00799	1,833	1,743	90	5,242,057	On Time		
1979	0.00933	1,358	1,292	66	3,884,480	Early 5 days		
1981	0.03314	1,109	1,035	74	3,171,484	Early 9 days		
1980	0.03588	1,140	1,063	77	3,261,378	Early 9 days		

Total Run Estimate Based on Offshore Test Fishing Information							
Assume 15 July is mean 50% point of run across transect (On Time)							
Fit of 1996 data to 1979-1995 data							
You need to enter data only in cells with light gray shading.							
You can sort the following list by MSS to rank estimates in order of best fit							
		Estimated Total CPUE					
Year	MSS	Current	Previous Day	Difference	Timing		
1987	0.00050	2,829	2,876	(47)	Late 2 days		
1994	0.00055	2,897	2,931	(34)	Late 4 days		
1991	0.00061	2,521	2,565	(44)	Late 2 days		
1983	0.00062	2,168	2,177	(9)	On Time		
1995	0.00067	2,051	2,072	(21)	On Time		
1993	0.00105	1,937	1,937	0	Early 1 day		
1982	0.00124	2,406	2,409	(3)	Late 2 days		
1986	0.00125	2,212	2,213	(1)	Late 1 day		
1992	0.00175	2,611	2,696	(85)	Late 2 days		
1990	0.00217	3,087	3,228	(141)	Late 3 days		
1985	0.00231	2,139	2,129	10	On Time		
1988	0.00399	1,834	1,815	19	Early 2 days		
1984	0.00654	1,582	1,556	26	Early 4 days		
1989	0.00803	1,972	1,939	33	On Time		
1979	0.01089	1,477	1,445	32	Early 5 days		
1981	0.03831	1,263	1,219	44	Early 9 days		
1980	0.04008	1,299	1,254	45	Early 9 days		
TOTAL RUN THROUGH		19 July		4,224,037			
Escapement					781,977		
	Above Sonar					649,980	
	Below Sonar					30,000	
	Unassessed (15% of total assessed)					101,997	
Cumulative Catch					2,650,744		
	Daily Drift					498,479	
	Daily Set					101,728	
Residual in District					791,317		
	Drift (40% expplotation, if full district; 25%, if reduced district)					747,719	
	Set (70% exploitation)					43,598	
1996 cumulative cpue		1,049 through		15 July			
1996 cumulative cpue		1,400 through		19 July			

Offshore Test Fishing Total Run Estimates for 1996							
Passage Rate (Total Run/Cumulative CPUE)					3,017	Based on	19 July harvest
Total cpue for season, if 15 July is 50% point:		2,097					
Run Estimate Based on Average Timing (15 July 50% Point)					6,328,501		
Run Remaining		2,104,464					
Run Estimates Based on Model Results (Fit of Current Year to Past Years)							
Year	MSS	Estimated Total CPUE			Estimated Total Run	Timing	Run Remaining
		Current	Previous Day	Difference			
1987	0.00050	2,829	2,876	(47)	8,535,572	Late 2 days	4,311,535
1994	0.00055	2,897	2,931	(34)	8,740,739	Late 4 days	4,516,702
1991	0.00061	2,521	2,565	(44)	7,606,284	Late 2 days	3,382,247
1983	0.00062	2,168	2,177	(9)	6,541,223	On Time	2,317,186
1995	0.00067	2,051	2,072	(21)	6,188,214	On Time	1,964,177
1993	0.00105	1,937	1,937	0	5,844,257	Early 1 day	1,620,220
1982	0.00124	2,406	2,409	(3)	7,259,309	Late 2 days	3,035,272
1986	0.00125	2,212	2,213	(1)	6,673,978	Late 1 day	2,449,941
1992	0.00175	2,611	2,696	(85)	7,877,829	Late 2 days	3,653,792
1990	0.00217	3,087	3,228	(141)	9,314,002	Late 3 days	5,089,965
1985	0.00231	2,139	2,129	10	6,453,725	On Time	2,229,688
1988	0.00399	1,834	1,815	19	5,533,488	Early 2 days	1,309,451
1984	0.00654	1,582	1,556	26	4,773,162	Early 4 days	549,125
1989	0.00803	1,972	1,939	33	5,949,858	On Time	1,725,821
1979	0.01089	1,477	1,445	32	4,456,359	Early 5 days	232,322
1981	0.03831	1,263	1,219	44	3,810,685	Early 9 days	(413,352)
1980	0.04008	1,299	1,254	45	3,919,303	Early 9 days	(304,734)

Total Run Estimate Based on Offshore Test Fishing Information							
Assume 15 July is mean 50% point of run across transect (On Time)							
Fit of 1996 data to 1979-1995 data							
You need to enter data only in cells with light gray shading.							
You can sort the following list by MSS to rank estimates in order of best fit							
		Estimated Total CPUE					
Year	MSS	Current	Previous Day	Difference	Timing		
1983	0.00089	2,110	2,135	(25)	On Time		
1994	0.00092	2,790	2,844	(54)	Late 4 days		
1993	0.00103	1,916	1,926	(10)	Early 1 day		
1995	0.00104	1,997	2,022	(26)	On Time		
1986	0.00126	2,177	2,195	(18)	Late 1 day		
1982	0.00128	2,362	2,385	(23)	Late 2 days		
1991	0.00130	2,414	2,466	(52)	Late 2 days		
1985	0.00212	2,125	2,133	(8)	On Time		
1992	0.00321	2,446	2,523	(78)	Late 2 days		
1988	0.00365	1,844	1,840	4	Early 2 days		
1990	0.00418	2,823	2,947	(124)	Late 3 days		
1984	0.00624	1,610	1,597	13	Early 4 days		
1987	0.00708	2,707	2,767	(61)	Late 2 days		
1989	0.00742	2,000	1,988	12	On Time		
1979	0.01067	1,517	1,498	19	Early 5 days		
1981	0.03834	1,327	1,296	31	Early 9 days		
1980	0.03962	1,363	1,332	31	Early 9 days		
TOTAL RUN THROUGH						22 July	4,768,290
Escapement							893,568
Above Sonar							757,016
Below Sonar							20,000
Unassessed (15% of total assessed)							116,552
Cumulative Catch							3,246,234
Daily Drift							195,966
Daily Set							94,708
Residual in District							628,487
Drift (40% exploitation, if full district; 25%, if reduced district)							587,898
Set (70% exploitation)							40,589
1996 cumulative cpue		1,049 through	15 July				
1996 cumulative cpue		1,496 through	22 July				

Offshore Test Fishing Total Run Estimates for 1996								
Passage Rate (Total Run/Cumulative CPUE)					3,187	Based on	22 July	harvest
Total cpue for season, if 15 July is 50% point:				2,097				
Run Estimate Based on Average Timing (15 July 50% Point)					6,684,513			
	Run Remaining		1,916,223					
Run Estimates Based on Model Results (Fit of Current Year to Past Years)								
		Estimated Total CPUE			Estimated		Run	
<u>Year</u>	<u>MSS</u>	<u>Current</u>	<u>Previous Day</u>	<u>Difference</u>	<u>Total Run</u>	<u>Timing</u>	<u>Remaining</u>	
1983	0.00089	2,110	2,135	(25)	6,723,023	On Time	1,954,734	
1994	0.00092	2,790	2,844	(54)	8,891,582	Late 4 days	4,123,293	
1993	0.00103	1,916	1,926	(10)	6,105,019	Early 1 day	1,336,730	
1995	0.00104	1,997	2,022	(26)	6,363,031	On Time	1,594,741	
1986	0.00126	2,177	2,195	(18)	6,938,426	Late 1 day	2,170,136	
1982	0.00128	2,362	2,385	(23)	7,526,696	Late 2 days	2,758,406	
1991	0.00130	2,414	2,466	(52)	7,693,626	Late 2 days	2,925,336	
1985	0.00212	2,125	2,133	(8)	6,771,432	On Time	2,003,143	
1992	0.00321	2,446	2,523	(78)	7,793,663	Late 2 days	3,025,373	
1988	0.00365	1,844	1,840	4	5,875,053	Early 2 days	1,106,763	
1990	0.00418	2,823	2,947	(124)	8,998,184	Late 3 days	4,229,894	
1984	0.00624	1,610	1,597	13	5,132,154	Early 4 days	363,864	
1987	0.00708	2,707	2,767	(61)	8,626,241	Late 2 days	3,857,951	
1989	0.00742	2,000	1,988	12	6,372,751	On Time	1,604,461	
1979	0.01067	1,517	1,498	19	4,836,091	Early 5 days	67,801	
1981	0.03834	1,327	1,296	31	4,228,986	Early 9 days	(539,303)	
1980	0.03962	1,363	1,332	31	4,344,416	Early 9 days	(423,874)	

Total Run Estimate Based on Offshore Test Fishing Information							
Assume 15 July is mean 50% point of run across transect (On Time)							
Fit of 1996 data to 1979-1995 data							
You need to enter data only in cells with light gray shading.							
You can sort the following list by MSS to rank estimates in order of best fit							
		Estimated Total CPUE					
Year	MSS	Current	Previous Day	Difference	Timing		
1993	0.00100	1,863	1,937	(74)	Early 1 day		
1995	0.00169	1,885	2,051	(166)	On Time		
1983	0.00180	1,973	2,168	(195)	On Time		
1986	0.00182	2,050	2,212	(162)	Late 1 day		
1985	0.00200	2,039	2,139	(100)	On Time		
1982	0.00230	2,183	2,406	(223)	Late 2 days		
1988	0.00269	1,849	1,834	15	Early 2 days		
1994	0.00404	2,424	2,897	(473)	Late 4 days		
1991	0.00414	2,135	2,521	(386)	Late 2 days		
1987	0.00466	2,335	2,829	(494)	Late 2 days		
1989	0.00547	2,011	1,972	39	On Time		
1984	0.00553	1,688	1,582	106	Early 4 days		
1992	0.00736	2,094	2,611	(517)	Late 2 days		
1979	0.01014	1,629	1,477	152	Early 5 days		
1990	0.01148	2,260	3,087	(827)	Late 3 days		
1980	0.03664	1,538	1,299	239	Early 9 days		
1981	0.03700	1,507	1,263	244	Early 9 days		
TOTAL RUN THROUGH		29-Jul	5,298,979				
Escapement					1,442,583		
	Above Sonar					1,224,420	
	Below Sonar					30,000	
	Unassessed (15% of total assessed)					188,163	
Cumulative Catch					3,782,752		
	Daily Drift					38,126	
	Daily Set					38,395	
Residual in District					73,644		
	Drift (40% exploitation)					57,189	
	Set (70% exploitation)					16,455	
1996 cumulative cpue		1,723 through	29-Jul				

Offshore Test Fishing Total Run Estimates for 1996									
Passage Rate (Total Run to Date/Cumulative CPUE to Date)							3,075	Based on	29-Jul harvest
Total cpue for season, if 15 July is 50% point:							2,098		
Run Estimate Based on Average Timing (15 July 50% Point)							6,452,268		
Run Estimates Based on Model Results (Fit of Current Year to Past Years)									
Year	MSS	Estimated Total CPUE			Estimated Total Run				
		Current	Previous Day	Difference					
1993	0.0010	1,863	1,937	(74)	5,729,540	Early 1 day			
1995	0.00169	1,885	2,051	(166)	5,797,200	On Time			
1983	0.00180	1,973	2,168	(195)	6,067,838	On Time			
1986	0.00182	2,050	2,212	(162)	6,304,647	Late 1 day			
1985	0.0020	2,039	2,139	(100)	6,270,817	On Time			
1982	0.00230	2,183	2,406	(223)	6,713,680	Late 2 days			
1988	0.00269	1,849	1,834	15	5,686,484	Early 2 days			
1994	0.00404	2,424	2,897	(473)	7,454,861	Late 4 days			
1991	0.00414	2,135	2,521	(386)	6,566,059	Late 2 days			
1987	0.00466	2,335	2,829	(494)	7,181,147	Late 2 days			
1989	0.00547	2,011	1,972	39	6,184,705	On Time			
1984	0.00553	1,688	1,582	106	5,191,339	Early 4 days			
1992	0.00736	2,094	2,611	(517)	6,439,966	Late 2 days			
1979	0.01014	1,629	1,477	152	5,009,888	Early 5 days			
1990	0.01148	2,260	3,087	(827)	6,950,489	Late 3 days			
1980	0.03664	1,538	1,299	239	4,730,023	Early 9 days			
1981	0.0370	1,507	1,263	244	4,634,684	Early 9 days			

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